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Short Communication:

EFFECT OF GROWTH REGULATORS ON THE SUCCESS OF TRENCH LAYERING OF DIFFERENT GUAVA (*PSIDIUM GUAJAVA* L) VARIETIES

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Guava (*Psidium guajava* L) can be propagated by both seeds and vegetative means. But seed propagation is not generally practiced since it takes many years to come into bearing, normally do not produce true-to-type and often bear fruits of inferior quality. Propagation through vegetative way can improve the quality and production of guava. Vegetative propagation by layering has a good scope for those plants. But moisture stress and shortage of mother plants as well as limited number of branches restricts the production of air-layer in large quantity. Other methods of propagation like trench layering can be done in the soil condition when easy maintenance of moisture level in the root zone is possible. Besides within the short period large number of propagules can be produced per unit area. Use of growth regulators accelerate profuse rooting and can save the plants from storm. Patel *et al.* (1996) observed that IAA + IBA promoted percentage of rooting, number of roots, length of roots, survival percentage of layers and shoot growth. IBA alone was better than IAA alone. So, the present experiment has been designed to investigate the different concentrations of growth regulators of guava trench layering on their survivability and growth performance.

The present study was carried out at Fruit Research Station, Binodpur, Rajshahi during May 2004 to May 2006. Treatments are shown in Table 1. In case of trench layering, mother layers were collected from air-layering which was done in the month of May, 2004. Layers collected through air-layering were planted at 90° angle maintaining a spacing of 90 cm × 70 cm in the month of July, 2004. After establishment (about one year), the mother layers were laid down on the ground at the bottom of the trench and fixed with the help of wire hook in the month of May, 2005.

The laid layers were covered with rooting media (Soil+ well decomposed cowdung). After 15-20 days a large number of shoots were developed from the each node of the mother plant. When the bark of the shoot was reddish in color then layering was done at the base of the shoot by removing 4 cm long bark cylindrically and then scrapped exposing wood to remove the cambium layer from them with the help of a knife. Different concentrations of growth regulators in the form of paste were applied on the upper cut end of the exposed shoot. In case of control treatment, the same procedure was followed except that no use of growth regulators. The treated wood was then covered with the mixture of soil, well decomposed cowdung, sawdust and coconut coir. Root was formed about nineteen to twenty days after operation.

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After root formation the rooted layers were separated from the mother plant after 75 days (July, 2005) from the date of operation. Moderate pruning was done to the separated layers to check water loss from them through transpiration. Then the layers were planted in polybags and placed in a shady place and watering was done according to the need.

The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The collected data on different parameters were statistically analysed and the means were compared by LSD test.

The effect of different guava variety and concentration of growth regulators showed significant effect on the percentage of success in rooting. Maximum success (100%) was obtained from the treatment combination V_1IBA_{1200} and minimum success (66.7%) was from V_3 x control (Table 1). This result was partially supported by Patel *et al.* (1996), who found the highest percentage of success in rooting when the layers Highest percentage (100%) of survivability was found from BARIGuava-1 with IBA $_{1200}$ and similar to 500, 800, NAA 500,800,1200, IAA 800,1200 and IBA 800,1200 where BARIGuava-2 with IBA 800, 1200, NAA 800,1200, IAA1200 and Kashi with IBA 1200. Bhagat *et al.* (1999) found that 88% survivability when the layers were treated with 3000 ppm IBA. The lowest percentage (76.4%) of survivability was obtained from Kashi and control treatment.

Combined effect of variety and concentration of growth regulators was significant in respect of number of roots per layer. Maximum number (53.0) of roots per layer was recorded from the treatment combination V_1IBA_{1200} (Table 1). This result is partially supported by Swingle *et al.* (1924) and Thimann (1935) who reported that IBA and NAA were found to be the most effective compound in stimulating adventitious root initiation. Maximum number (10.0) of roots was found from V_3x control (Table 1).

Combined effect of variety and growth regulators was highly significant in respect of length of roots per layer. The maximum root (17.0 cm) was obtained from the treatment combination V_1IBA_{1200} which was statistically similar to V_2IBA_{1200}. while shortest (9.2 cm) length from the treatment combination of V_3x control (Table 1). In case of trench layering all varieties showed better performance than air layering and mound layering. Significant variation was noticed in fresh weight of roots per layer due to the combined effect of variety and growth regulators. Maximum (28.5 g) fresh weight was obtained from the treatment combination V_1 IBA_{1200} while minimum fresh weight (7.5 g) from the treatment combination V_3 x control. Variation in the fresh weight of roots in different variety of guava was due to the variation of number and length of roots. Combined effect of variety and concentration of growth regulators significantly affected by the dry weight of roots per layer. Maximum (16.6 g) dry weight showed from the treatment combination V_1IBA_{1200} while minimum (4.0 g) from V_3 x control treatment combination (Table 1). Highest number (50.0) of shoots per layer was found from V_1IBA_{1200} treatment combination while lower number (14.0) of shoots per layer from V_3 x control treatment at different days. Highest number (243.3) of leaves was observed from the treatment combination V_1IBA_{1200} and minimum number (84.0) of leaves was found from the treatment combination V_3x control. This result is supported by Bhagat *et al.* (1999) who found the highest number of leaves when the layers were treated with 2500 ppm IBA.

Conclusion

The results of the study revealed that the use of growth regulators had significant effect on the rooting success and survivability of guava. It can be concluded that the guava variety BARIGuava-1 with growth regulator, IBA 1200 ppm showed the best performance incase in rooting of trench layering.

Table 1. Effect of growth regulators on the growth and success of different varieties guava in trench layering

Treat-ments	Success in rooting (%)	Percentage of Survivability (%)	No. of roots/layer	Length of root/layer (cm)	Fresh weight of roots/layer (g)	Dry weight of roots/layer (g)
V_1x Control	72.0	84.0	15	10.2	9.8	6.1
V_1IBA_{300}	85.8	97.1	26	13.6	15.0	7.3
V_1IBA_{500}	94.0	100.0	33	14.3	16.8	9.0
V_1IBA_{800}	96.0	100.0	41	15.6	21.0	11.1
V_1IBA_{1200}	100.0	100.0	53	17.0	28.5	16.6
V_1NAA_{300}	83.3	94.0	24	12.5	15.6	7.0
V_1NAA_{500}	93.0	100.0	30	13.7	16.0	8.2
V_1NAA_{800}	95.0	100.0	38	15.5	20.3	11.0
V_1NAA_{1200}	98.0	100.0	50	16.2	28.0	16.0
V_1IAA_{300}	80.0	93.0	21	11.0	13.9	6.8
V_1IAA_{500}	91.3	99.0	28	13.6	15.3	8.0
V_1IAA_{800}	94.0	100.0	35	14.0	19.6	10.0
V_1IAA_{1200}	97.5	100.0	47	15.8	26.5	15.2
V_2x Control	70.0	83.0	13	9.8	8.7	5.3
V_2IBA_{300}	82.0	94.3	24	13.0	14.6	7.0
V_2IBA_{500}	93.1	99.3	30	14.2	16.6	8.5
V_2IBA_{800}	95.0	100.0	38	15.0	20.0	10.1
V_2IBA_{1200}	98.2	100.0	51	16.4	28.0	16.0
V_2NAA_{300}	80.0	91.2	22	12.2	13.9	6.8
V_2NAA_{500}	91.2	98.7	28	13.4	15.1	8.0
V_2NAA_{800}	93.0	100.0	35	14.9	19.5	9.2
V_2NAA_{1200}	96.4	100.0	47	15.4	27.0	15.4
V_2IAA_{300}	78.0	90.4	20	11.2	13.0	6.1
V_2IAA_{500}	87.0	96.8	26	13.1	15.0	7.3
V_2IAA_{800}	92.0	99.0	33	13.3	18.3	9.0
V_2IAA_{1200}	95.4	100.0	45	15.2	24.1	15.0
V_3x Control	66.7	76.4	10	9.2	7.5	4.0
V_3IBA_{300}	78.0	90.0	20	12.4	13.2	6.0
V_3IBA_{500}	88.9	96.2	25	13.8	15.0	7.6
V_3IBA_{800}	91.0	97.0	32	14.2	18.0	9.0
V_3IBA_{1200}	96.9	100.0	45	15.9	26.0	14.1
V_3NAA_{300}	75.0	89.9	18	12.0	12.0	5.8
V_3NAA_{500}	86.0	94.5	24	13.1	14.0	7.0
V_3NAA_{800}	89.0	96.0	30	14.3	17.6	8.7
V_3NAA_{1200}	95.4	99.3	42	15.1	25.3	13.6
V_3IAA_{300}	71.0	87.0	16	10.6	11.05	6.03
V_3IAA_{500}	83.2	91.4	21	11.5	13.45	6.20
V_3IAA_{800}	87.8	93.0	28	13.1	16.20	8.02
V_3IAA_{1200}	91.9	98.0	37	15.0	24.00	12.05
LSD $_{(0.05)}$	1.49	1.57	2.44	0.84	1.29	1.41
CV (%)	1.04	1.01	4.87	3.80	4.47	9.29

V_1 = BARIGuava-1, V_2 = BARIGuava-2 and V_3 = Kashi

Table 2. Effect of growth regulators on the number of shoot and leaf of guava trench layering at different days after planting (DAP)

Treatments	Number of shoot at				Number of leaf at			
	25 DAP	100 DAP	175 DAP	280 DAP	25 DAP	100 DAP	175 DAP	280 DAP
V_1x Control	7.0	12.0	15.0	19.0	27.3	51.0	69.0	102.0
V_1IBA_{300}	10.0	16.0	20.3	24.3	39.0	79.0	100.3	147.3
V_1IBA_{500}	13.3	19.3	22.0	25.3	41.3	95.0	118.3	168.0
V_1IBA_{800}	14.0	21.0	25.3	29.3	47.0	102.0	121.0	183.0
V_1IBA_{1200}	20.0	30.0	43.0	50.0	71.0	114.3	155.0	243.3
V_1NAA_{300}	9.0	14.0	17.0	22.0	37.0	67.3	87.0	124.0
V_1NAA_{500}	10.3	17.0	19.0	23.3	41.0	87.0	110.0	144.0
V_1NAA_{800}	12.3	18.0	23.0	27.0	46.0	93.0	114.3	152.3
V_1NAA_{1200}	18.0	27.0	33.0	39.0	56.0	105.3	135.0	205.3
V_1IAA_{300}	8.0	12.0	15.0	19.0	35.0	63.0	84.0	122.0
V_1IAA_{500}	9.0	15.0	17.0	22.3	40.6	72.0	96.0	132.0
V_1IAA_{800}	10.3	16.0	20.0	26.3	40.3	82.3	105.3	146.0
V_1IAA_{1200}	15.3	24.0	26.0	30.0	51.0	103.0	125.0	188.0
V_2x Control	5.0	10.0	12.0	17.0	23.0	42.0	59.0	86.0
V_2IBA_{300}	7.0	12.0	15.0	20.3	34.3	54.0	72.3	110.3
V_2IBA_{500}	10.0	14.0	18.3	22.0	40.3	64.3	86.0	134.0
V_2IBA_{800}	11.3	16.0	19.0	24.0	42.0	75.0	106.0	163.0
V_2IBA_{1200}	16.0	23.0	31.0	39.0	56.3	94.0	133.0	208.0
V_2NAA_{300}	7.0	11.0	14.0	19.0	32.0	47.0	67.0	104.0
V_2NAA_{500}	8.0	14.0	16.0	20.0	35.3	55.3	79.0	117.0
V_2NAA_{800}	9.3	15.0	20.0	24.0	39.6	67.0	96.0	179.3
V_2NAA_{1200}	13.6	17.3	22.0	30.3	53.0	84.0	116.3	210.6
V_2IAA_{300}	6.0	9.0	12.0	17.0	29.0	44.0	61.0	92.0
V_2IAA_{500}	7.0	12.0	14.0	19.0	33.0	51.0	73.0	109.0
V_2IAA_{800}	8.0	13.3	17.0	23.0	34.0	59.3	86.0	131.0
V_2IAA_{1200}	12.3	16.0	20.3	25.0	50.0	78.3	106.3	167.0
V_3x Control	4.0	7.0	9.0	14.0	21.0	40.0	57.0	84.0
V_3IBA_{300}	6.3	11.0	14.0	18.0	32.0	51.0	70.3	108.0
V_3IBA_{500}	8.0	13.0	16.3	19.0	37.0	61.3	84.0	132.0
V_3IBA_{800}	9.0	14.0	17.3	23.0	39.0	73.0	102.0	159.3
V_3IBA_{1200}	12.3	18.3	23.0	29.0	49.3	89.0	128.3	202.0
V_3NAA_{300}	5.0	8.0	11.0	16.0	31.0	45.0	65.0	102.0
V_3NAA_{500}	7.0	11.0	13.0	17.3	34.0	53.0	77.3	115.3
V_3NAA_{800}	8.0	12.0	17.0	21.3	38.0	65.0	93.0	140.0
V_3NAA_{1200}	10.3	16.3	20.0	26.3	48.0	79.0	111.0	173.0
V_3IAA_{300}	5.0	6.0	10.0	14.0	29.3	42.3	59.3	63.0
V_3IAA_{500}	6.0	9.0	11.0	16.0	34.0	49.0	71.0	107.0
V_3IAA_{800}	7.3	10.0	14.0	20.0	37.0	56.0	84.0	129.0
V_3IAA_{1200}	9.0	15.0	18.0	24.3	45.0	73.3	103.3	162.0
$LSD_{(0.05)}$	1.50	2.35	2.15	2.35	2.56	1.99	2.29	25.29
CV (%)	9.59	9.81	7.17	6.16	3.97	1.77	1.50	10.94

References

Akhter, M.S 2002. Effect of time and methods on the success of layering in guava (*Psidium guajava*). M.S. Thesis, Dept. of Hort. BAU, Mymensingh.

Bhagat, B.K., B.P. Jain, C. Singh and B.M. Chowdhury. 1999a. Studies on the propagation of guava by ground layering in polybags. *Orissa J. Hort.,* **27** (1): **19**-21.

Bhagat, B.K., C. Signh and B.M. Chowdhury. 1999b. Effect of gworth substances on rooting and survival of air-layers of guava. *Orissa. J. Hort.,* **27** (2): 72-75.

Patel, R.K., U.S. Bose and S.K. Tripathi. 1996. Effect of growth regulators and wrappers on success and survival of air-layering in guava. *Crop Res. Hisar.,* **12** (1): 56-60.

Swingle, W.T.R., Robinson and J.E. May. 1924. The solar propagating frame for rooting citrus and other sub-tropical plants. V.S. *Deptt. Agric. Cure.,* pp310:13.

Thimann, K.V. 1935. On an analysis of activity of two growth promoting substances on plant tissues. Proc. Kon. Akad, Wetench Amsterdam **38**: 896-912.